

REMARKS

Enclosed is a Petition for an extension of time and the appropriate fee.

Claims 1, 17, and 21 are herein amended. New Claims 23-29 are added. Claims 1-29 remain in the case.

Claims 1, 17, and 21 are amended to recite the discharge electrode is exposed to the air (Specification page 6 ll. 18-24). Claim 21 is amended to remove the phrase "in a non-thermal way". Applicant respectfully submits that the specification as originally filed adequately supports the described emission without this limitation (Specification page 6 ll. 18-30).

New Claims 23-29 are drawn to the virtual positive electrode and the difference in impedance between the load resistance section and the air and are believed allowable over the cited references (Specification page 6 ll. 22-30).

The present invention as defined in the claims is drawn to application in an air cleaning device and may be either a stand-alone unit, or may be incorporated within an air conditioning unit. The present invention does not include an explicit positive electrode section (anode), and the negative electrode section (cathode) or needle electrode is arranged so that the distal end of the discharge electrode section is exposed to the air. As taught in the specification as originally filed, the air around the discharge electrode section acts as a virtual positive electrode. Since the impedance of the load resistance section is higher than the impedance between the virtual positive electrode and the discharge electrode section, negatively charged electrons are emitted from the discharge electrode section into the air.

Applicant respectfully submits that the previous arguments submitted in the Office Actions regarding the supposed thermal action (thermionic emission) in the apparatus of the

present invention are not an accurate representation of the non-thermionic emission effect as taught and claimed. It is well known in the art that charged particles on the surface of a conductor will attempt to arrange themselves evenly across the surface of the conductor to reduce the total electrostatic potential. One can consider a "crowding effect" caused by an accumulation of charged particles on a conductive surface having a sharply defined region that will allow some of the charged particles to be liberated from the conductive surface at the sharply defined region due to the locally extreme, mutually repulsive forces caused by the evenly distributed charged particles at the sharply defined region. The "current flow" caused by the liberation and subsequent replacement of a relatively small number of charged particles will likely not be measurable either as a current, or as a thermal effect caused by a current. Applicant respectfully submits that merely applying a potential to the needle electrode will does not cause a measurable current to pass through the needle electrode. Hence, the needle electrode is not measurably heated by the current flow, and heating is not operative in the emission process of the claimed invention. Only after electrons are liberated from the tip of the needle electrode (the sharply defined region) will the liberated electrons be replaced causing a very small, almost unmeasurable flow of electrons.

In contrast to the present claimed invention, *Fujisawa* ("Fujisawa", U.S. Patent No. 3,808,498) and *Tsunoda et al* ("Tsunoda", U.S. Patent No. 5,536,944) teach a electron beam generating source using a heated cathode or filament disposed within a vacuum condition and arranged with an anode for use in an electron microscope, for example (Fujisawa col. 3 ll. 24-50 and Tsunoda col. 2 ll. 31-41). The thermally active nature of the Fujisawa and Tsunoda devices as well as the differences with the present claimed invention were discussed in the Amendment dated August 4, 2003.

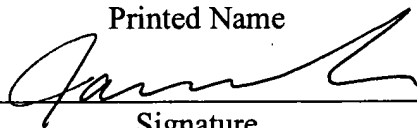
It is believed that all claims are in condition for allowance, and an early notification of the same is requested.

If the Examiner believes that a telephone interview will help further the prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

I hereby certify that this document and fee is being deposited with the U.S. Postal Service as first class mail under 37 C.F.R. §1.8 and is addressed to Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450


on: March 4, 2004
Date

by: James Lee
Printed Name


Signature

Respectfully submitted,

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